IT IS CLAIMED:

1. A method of determining the relative amounts of individual polynucleotides in a mixture of different-sequence polynucleotides, comprising

labeling the polynucleotides with a fluorescent reporter, to form a mixture of labeled polynucleotides,

contacting the labeled polynucleotides, under hybridization conditions, with a microarray of different DNA sequences disposed at discrete locations a non-porous surface, at a density of at least about 100 locations/cm^2, where the different DNA sequences in the array are each (i) present in multiple copies, and (ii) effective to hybridize to individual polynucleotides in the mixture, and

determining the level of fluorescence at each position in the microarray.

2. The method of claim 1, wherein said contacting includes covering the array surface with a solution of the mixture of labeled polynucleotides, to a solution depth of less than 500 microns.

3. The method of claim 1, wherein the DNA sequences in the array are at least about 50 bases in length.

4. The method of claim 1, wherein the labeled polynucleotides represent at least 1 million unique base sequences.

5. The method of claim 1, wherein the density of array elements corresponding to different-sequence DNA locations in the array is at least 1,000/cm^2.

6. The method of claim 1, for use in determining the relative amounts of each polynucleotide from first and second different sources, wherein (i) the polynucleotides from the first and second sources are labeled with independently detectable first and second fluorescent reporters, respectively, (ii) said contacting of labeled polynucleotides from first and second sources is carried out simultaneously under competitive hybridization conditions, and (iii) said determining includes measuring the levels of the two reporters at each position in the array.